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10/518,845	12/21/2004	Marie Jacob	FR 020067	1286

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EXAMINER
PARK, EDWARD

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-13* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-6 and 11-13* is/are rejected.

7) ☒ Claim(s) *7-10* is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *21 December 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some *   c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date *12/21/04, 11/16/06.*

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1.   The drawings are objected to because figure 5 has numerals that point to empty boxes that do not have any written description. It is unclear what the boxes represent without any text within the boxes. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2.   **Claims 7-10** are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim shall not serve as a basis for any other multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims 7-10 have not been further treated on the merits.

3.   **Claim 3** is objected to because of the following informalities: The preamble, "image processing method", appears to be a typographical error and should be changed to "image processing system". Appropriate correction is required.

Claim Objections - 37 CFR 1.75(a)

4.   The following is a quotation of 37 CFR 1.75(a):

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

5.   **Claim 5/1** is objected to under 37 CFR 1.75(a), as failing to conform to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery.

Regarding claim 5/1, the phrase, "2D simplified phase representation", is not supported and does not have antecedent basis in claim 1. For examination purposes, "2D simplified phase representation" will not be considered since it is not supported by claim 1. Correction is required.

Claim Rejections - 35 USC § 101

6.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

7.   **Claim 13** is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 13 defines a computer program product embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed computer program product can range from paper

on which the program is written, to a program simply contemplated and memorized by a person.

The examiner suggests amending the claim to embody the program on "computer-readable

medium" or equivalent in order to make the claim statutory.   Any amendment to the claim

should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

9.   **Claims 1, 2, 3, 4, 5/1, 6, 11, 12, 13** are rejected under 35 U.S.C. 103(a) as being

unpatentable over the combination of Maurincomme et al. (US 6,879,711 B2) with Metaxas (US

6,295,464 B1), and further in view of Ryals et al (US 5,803,914)

Regarding **claim 1, 2,** Maurincomme discloses an image processing system for

displaying information relating to the amplitude of displacements of wall regions of a

deformable 3D object under study comprising acquisition means for acquiring image data of an

image sequence of the 3D object under study (col. 1, lines 59-65: three-dimensional digital

angiography image obtained by means of a radiology apparatus and a three-dimensional digital

image obtained by means of a nuclear magnet resonance apparatus; col. 3, lines 65-67; col. 4,

lines 1-22), and further comprising processing means for:

processing the 3D object data in the images of the sequence for locating the 3D object wall (see

figure 5, numeral 19; col. 11, lines 22-50 the outer surface is determined which is equivalent to a

wall),

defining at least a region of interest on the object wall (see figure 5, numeral 20; col. lines 22-50

the inner surface is considered the region on interest on the object wall which can be seen since it

is contained within the surface of figure 5, numeral 19; which is further seen in detail in figure

7), and

constructing a first 2D simplified representation of the 3D object wall by projection of the

3D object wall along an axis, comprising the projection(s) of the region(s) of interest in said 2D

simplified representation (figure 7). Maurincomme does not disclose processing the image data

of the 3D object wall to determine the amplitude of displacement of said region(s) of interest in

function of time and displaying indications of the amplitudes of displacement of the region(s) of

interest of the 3D object wail in the respective projection(s) of said region(s) of interest, called

segments, in said constructed 2D simplified representation.

Metaxas teaches processing the image data of the 3D object wall to determine the

amplitude of displacement of said region(s) of interest in function of time (figure 9a-c) and

maximal or minimal amplitudes of displacements of the region(s) of interest over a period of

time (col. 12, lines 45-63).

It would have been obvious at the time the invention was made to one of ordinary skill in

the art to modify the Maurincomme teaching to determine amplitude of displacement as a

function of time as suggested by Metaxas, in order to track the motion of the object/region of

interest for "characterization of heart wall motion on a regional level to understand cardiac mechanics and the processes underlying a disease" (Metaxas: col. 2, lines 31-35).

Ryals teaches comprising display means for: displaying indications of the amplitudes of displacement of the region(s) of interest of the 3D object wall in the respective projection(s) of said region(s) of interest, called segments, in said constructed 2D simplified representation (figure 15, numeral 1528).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Maurincomme with Metaxas combination to display indications of amplitudes of displacement as suggested by Ryals, in order for the user to easily observe any significant changes in the displacement of the region of interest.

Regarding **claims 3, 4**, Maurincomme, Metaxas, with Ryals combination discloses all elements as mentioned above in claim 1. Marincomme, Metaxas, with Ryals combination as applied to claim 1 does not disclose constructing a second 2D simplified representation of the 3D object wall called 2D simplified phase representation; displaying 2D simplified phase representation; and means to display the 2D simplified amplitude representation and the 2D simplified phase representation together in a same image.

Ryals teaches constructing a second 2D simplified representation of the 3D object wall called 2D simplified phase representation; displaying 2D simplified phase representation (col. 5, lines 50-67; means for displaying a first image during diastolic phase of a cardiac cycle and systolic phase); and means to display the 2D simplified amplitude representation and the 2D simplified phase representation together in a same image (figure 13; col. 38, lines 27-48).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Maurincomme, Metaxas, with Ryals combination as applied to claim 1 to utilize a phase representation and display it simultaneously with the amplitude representation as suggested by Ryals, in order for the user to easily observe any significant changes in the displacement of the region of interest and to further enhance the visual information available to the user.

Regarding **claims 5/1 and 6**, Maurincomme, Metaxas, with Ryals combination discloses all elements as mentioned above in claim 1. Marincomme, Metaxas, with Ryals combination as applied to claim 1 does not teach display the values of amplitude and of time in the respective 2D simplified amplitude representation in a color-coded manner.

Ryals teaches display the values of amplitude (figure 13, numeral 1370) and of time (figure 3, numeral 365) in the respective 2D simplified amplitude representation in a color-coded manner (figure 15, numeral 1528) and means to display (figure 2, numeral 105) indications of the amplitudes of displacement of the region(s) of interest of the 3D object wall in the respective projection(s) of the region(s) of interest, called segments, in said constructed 2D simplified representation, in a color-coded manner, the indications of the amplitudes of displacement changing in the segments at the rate of the images of the sequence, so as to form an animated 2D simplified representation in function of time (figure 13; col. 39, lines 39-67; col. 40, lines 1-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Maurincomme, Metaxas, with Ryals combination as applied to claim 1 to display indications of amplitudes of displacement in a color-coded manner as suggested by

Ryals, in order for the user to easily observe any significant changes in the displacement of the

region of interest.

Regarding **claims 11, 13,** Maurincomme discloses an image processing method and a

computer program product (col. 4, lines 35-38) comprising steps of: acquiring image data of an

image sequence of the organ under study ("fifty DSA image"… "acquired sequence"; col. 3,

lines 65-67; col. 4, lines 1-23), segmenting the 3-D organ in the images of the sequence for

locating the 3D object wall (figure 5, figure 6; the 3-D organ is segmented), defining at least a

region of interest on the segmented 3D organ wall (figure 5, numeral 19), and

constructing a first 2D simplified representation of the 3D segmented organ wall by projection of

the 3D segmented organ wall along an axis, comprising the projection(s) of the region(s) of

interest in said 2D simplified representation (figure 7) and a computer program product.

Maurincomme does not disclose processing the image data to determine the amplitude of

displacement of said region(s) of interest in function of time; and displaying indications of the

amplitudes of displacement of the region(s) of interest of the 3D segmented organ wall in the

respective projection(s) of the region(s) of interest, called segments, in said constructed 2D

simplified representation, in a color coded manner.

Metaxas teaches processing the image data to determine the amplitude of displacement of

said region(s) of interest in function of time (col. 12, lines 45-63).

It would have been obvious at the time the invention was made to one of ordinary skill in

the art to modify the Maurincomme teaching to determine amplitude of displacement as a

function of time as suggested by Metaxas, in order to track the motion of the object/region of

interest for "characterization of heart wall motion on a regional level to understand cardiac mechanics and the processes underlying a disease" (Metaxas: col. 2, lines 31-35).

Ryals teaches displaying indications of the amplitudes of displacement of the region(s) of interest of the 3D segmented organ wall in the respective projection(s) of the region(s) of interest, called segments, in said constructed 2D simplified representation, in a color coded manner (figure 15, numeral 1528).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Maurincomme with Metaxas combination to display indications of amplitudes of displacement as suggested by Ryals, in order for the user to easily observe any significant changes in the displacement of the region of interest.

Regarding **claim 12**, Maurincomme, Metaxas, with Ryals combination discloses all elements as mentioned above in claim 11. Marincomme, Metaxas, with Ryals combination as applied to claim 11 does not teach displaying indications of the maximal or minimal amplitudes of displacement of the region(s) of interest;

constructing a second 2D simplified representation being called 2D simplified phase representation;

displaying indications of the instants of time at which the maximum or minimum of amplitudes of displacements occur(s) in the region(s) of interest, over a period of time, in said 2D simplified phase representation; and displaying the 2D simplified amplitude representation and the 2D simplified phase representation in a same image at the same time.

Metaxas discloses maximal or minimal amplitudes of displacements of the region(s) of interest over a period of time (col. 12, lines 45-63).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Maurincomme, Metaxas, with Ryals combination as applied to claim 11 to utilize maximal minimal amplitude of displacement as suggested by Metaxas, in order to enhance the tracking of the motion of the object/region of interest for "characterization of heart wall motion on a regional level to understand cardiac mechanics and the processes underlying a disease" (Metaxas: col. 2, lines 31-35).

Ryals teaches constructing a second 2D simplified representation being called 2D simplified phase representation (col. 5, lines 50-67; means for displaying a first image during diastolic phase of a cardiac cycle and systolic phase); displaying indications of the instants of time at which the maximum or minimum of amplitudes of displacements occur(s) in the region(s) of interest, over a period of time, in said 2D simplified phase representation (figure 13; col. 38, lines 27-48); and displaying the 2D simplified amplitude representation and the 2D simplified phase representation in a same image at the same time (figure 13; col. 38, lines 27-48).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Maurincomme, Metaxas, with Ryals combination as applied above to utilize a phase representation and display it simultaneously with the amplitude representation as suggested by Ryals, in order for the user to easily observe any significant changes in the displacement of the region of interest and to further enhance the visual information available to the user.

Conclusion

10.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward Park whose telephone number is (571) 270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

<div style="text-align: right;">

Edward Park
Examiner
Art Unit 2624

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/Edward Park/

VIKKRAM BALI
PRIMARY EXAMINER